



State of Utah

JON M. HUNTSMAN, JR.  
*Governor*

GARY R. HERBERT  
*Lieutenant Governor*

Department of Administrative Services

D'ARCY DIXON PIGNANELLI  
*Executive Director*

Division of Facilities Construction and Management

F. KEITH STEPAN  
*Director*

## ADDENDUM #1

Date: 15, November 2005

To: Contractors

From: Craig Wessman, Project Manager

Reference: Utah Valley State College  
Large Irrigation Pond Rehabilitation  
DFCM Project No. 05227790

Subject: **Addendum No. 1**

Pages	Addendum	1 Page
	Response to Questions	1 Page
	Revised Bid Form	2 Pages
	Section 00310	2 Pages
	Section 01010	2 Pages
	Section 01025	4 Pages
	Geotechnical Report	13 Pages
	Total Pages	25 Pages

---

**Note: This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.**

### 1.1 GENERAL

1.1.1 Reference the attachments.

1.1.2 Contractors are to turn in the Revised Bid Form only, the supplemental bid form included in Section 00310 is for REFERENCE ONLY.

*End of Addendum*

**ADDENDUM NO. 1**  
**to**  
**UVSC IRRIGATION POND REHABILITATION**

**BIDDING DOCUMENTS**

**November 14, 2005**

---

The Bidding Documents, Technical Specifications, and Drawings are hereby revised to include the following changes, deletions, and additions. **Contractors Bidding the project shall conform to these revisions and acknowledge receipt of this Addendum on the BID FORM.**

**RESPONSE TO QUESTIONS**

Question: Where is power located for the sump pump?

Answer: UVSC will provide the exact location for power hookup. However, power is located nearby and should not be more than 200' to 400' away.

Question: What are the 4" diameter holes for, that are to be cored in the existing curb wall?

Answer: The 4" holes are to be placed in the existing curb wall, just above the new concrete liner, for some new piping that will be installed by the client.

Clarification: The existing concrete structure, located at the north end of the large pond, is a pump intake structure. The structure has square notches/windows with screens to allow water to enter the structure. The structure is to be removed during construction and replaced after the concrete liner is in place. The notches/windows should be lengthened and screens replaced per the drawing specifications. See drawing CD104

Clarification: The width of the control joint must be constructed so the Sikaflex sealant can be placed per the manufactures specifications (2:1 width to depth ratio, 1/4" minimum, 1/2 maximum, etc). Per the Sikaflex 1a specifications the minimum joint width must be saw cut to 1/2" to provide a minimum sealant depth of 1/4" (2:1 width to depth ratio). The joint depth must be saw cut to a minimum depth of 1 1/2" with a backer rod installed at the proper depth for the Sikaflex sealant 2:1 width to depth ratio.

**THIS ADDENDUM IS HEREBY ATTACHED TO AND MADE A PART OF THE BIDDING DOCUMENTS, AND EACH BIDDER SHALL ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN HIS/HER BID.**

**ADDENDUM NO. 1 IS HEREBY ISSUED ON November 14, 2005**



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

**Division of Facilities Construction and Management****DFCM****BID FORM - REVISED**

NAME OF BIDDER \_\_\_\_\_ DATE \_\_\_\_\_

To the Division of Facilities Construction and Management  
4110 State Office Building  
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with your invitation for bids for the **LARGE IRRIGATION POND REHABILITATION – UTAH VALLEY STATE COLLEGE – OREM, UTAH - DFCM PROJECT NO. 05227790** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: \_\_\_\_\_

For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$\_\_\_\_\_) (In case of discrepancy, written amount shall govern)

**UNIT PRICES**

<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Amount</u>
1.	Mobilization	1	LS		\$_____
2.	Excavation/removal of liner, sediment, subbase material	7,000	CY	\$_____	\$_____
3.	Underdrain system with perforated pipe and sump	1	LS		\$_____
4.	Furnish/install washed rock/fill	4,000	CY	\$_____	\$_____
5.	Furnish/install geotextile	72,000	SF	\$_____	\$_____
6.	Reinforced concrete liner system	1	LS		\$_____
7.	Misc items (landscape, project management, traffic control, overhead, etc)	1	LS		\$_____

BID FORM  
PAGE NO. 2

I/We guarantee that the Work will be Substantially Complete by **March 1, 2006**, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **\$350.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of \_\_\_\_\_

The undersigned Contractor's License Number for Utah is \_\_\_\_\_.

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract.

The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable 100% Performance and Payment bonds are not delivered within the time set forth.

Type of Organization: \_\_\_\_\_  
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference  
Laws: \_\_\_\_\_

Respectfully submitted,

\_\_\_\_\_  
Name of Bidder

ADDRESS:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Authorized Signature

**SECTION 00310**

**BID SCHEDULES**

1.01 PROJECT IDENTIFICATION

A. Name: **UTAH VALLEY STATE COLLEGE**  
**LARGE IRRIGATION POND REHABILITATION**

B. Submitted to: Division of Facilities Construction and Management  
4110 State Office Bldg.  
Salt Lake City, Utah 84111

1.02 RELATED REQUIREMENTS

A. Section 01025: Measurement and Payment

DFCM  
UVSC LARGE IRRIGATION POND REHABILITATION

---

1.01 BASE BID SCHEDULE

LARGE POND (POND 1)					
ITEM	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL AMOUNT
1	MOBILIZATION	1	LS		
2	EXCAVATION AND REMOVAL OF LINER, SEDIMENT, AND SUB-BASE MATERIAL	7000	CY		
3	UNDERDRAIN SYSTEM W/PERFORATED PIPE & SUMP	1	LS		
4	FURNISH AND INSTALL WASHED ROCK/FILL	4000	CY		
5	FURNISH AND INSTALL GEOTEXTILE	72000	SF		
6	REINFORCED CONCRETE LINER SYSTEM	1	LS		
7	MISC ITEMS (LANDSCAPE, PROJECT MANAGEMENT, TRAFFIC CONTROL, OVERHEAD, ETC)	1	LS		
TOTAL BID (SHOULD AGREE WITH THE SUM OF UNIT COSTS TIMES QTYS)					

THE FOLLOWING INFORMATION IS ACKNOWLEDGED BY THE BIDDER:

- A. The BIDDER acknowledges that the OWNER may elect to increase or decrease the estimated quantities indicated in the above tables to reflect conditions encountered during installation of facilities.

COMPANY: \_\_\_\_\_

Signed: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

**SECTION 01010**

**SUMMARY OF WORK**

**PART 1      GENERAL**

**1.01    GENERAL CONDITIONS**

- A.     The work to be performed under this project shall consist of furnishing all labor, materials, and equipment necessary or required to complete the work in all respects as shown on the plans and as herein specified. All work, materials, and services not expressly shown or called for in the Contract Documents which may be necessary to complete the construction of the work in good faith shall be performed, furnished, and installed by CONTRACTOR as though originally so specified or shown, at no increase in cost to OWNER.

**1.02    WORK COVERED BY CONTRACT DOCUMENTS**

- A.     The purpose of this project is to rehabilitate the existing large irrigation pond on the UVSC campus. The work shall include the removal of the existing PVC liner, excavation to the proposed grades, and construction of a new concrete liner. The work shall also include the placement of a groundwater under drain collection system.

**1.03    CONTRACT METHOD**

- A.     The work hereunder will be constructed under a unit cost and lump sum contract.
- B.     CONTRACTOR shall include the General Conditions and Supplementary Conditions of the Contract as a part of all of its subcontract agreements.

**1.04    WORK SEQUENCE**

- A.     The contract time for substantial and final completion is March 1, 2006.

**1.05    CONTRACTOR USE OF PROJECT SITE**

- A.     CONTRACTOR's use of the project site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities, and field offices.

**1.06 PROJECT SECURITY**

- A. CONTRACTOR shall make all necessary provisions to protect the project and CONTRACTOR's facilities from fire, theft, and vandalism, and the public from unnecessary exposure to injury.

**1.07 CHANGES IN THE WORK**

- A. It is mutually understood that it is inherent in the nature of municipal construction that some changes in the plans and specifications may be necessary during the course of construction to adjust them to field conditions, and that it is of the essence of the Contract to recognize a normal and expected margin of change. The ENGINEER shall have the right to make such changes, from time to time, in the plans, in the character of the work, and in the scope of the project as may be necessary or desirable to ensure the completion of the work in the most satisfactory manner without invalidating the Contract.

- END OF SECTION -

**SECTION 01025**

**MEASUREMENT AND PAYMENT**

**PART 1 GENERAL**

**1.01 GENERAL**

- A. All work completed under this contract shall be in accordance with the Plans and Specifications and will be measured by the ENGINEER.
- B. The term "Lump Sum" when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure, portion of work, or unit is specified "Lump Sum" as the unit of measurement, the unit will include fittings, accessories, and all work necessary to complete the work as shown on the plans and as specified.
- C. Discounts and Sales Tax.
- D. The contract will be awarded on a total base bid as indicated on the bid form. The unit cost will only apply for changes in the contract.
  - 1. CONTRACTOR shall maintain full responsibility for all materials and is to include all costs of materials and taxes as part of their bid.

**1.02 UVSC LARGE IRRIGATION POND REHABILITATION**

**A. MOBILIZATION**

- 1. **GENERAL** This bid item is provided to cover CONTRACTOR's cost for general and miscellaneous responsibilities and operations not normally attributed to, any other single bid item within this schedule. This shall include, but is not limited to, work described or enumerated in Section 01505, Mobilization.
- 2. **METHOD OF MEASUREMENT** Mobilization shall not be measured, but shall be paid for on a lump sum basis for the completion of the work as required in Section 01505, Mobilization
- 3. **BASIS OF PAYMENT** Payment for "Mobilization" will be made at the contract lump sum bid price. Payments will be made in accordance with the following schedule:

- a. When 10% of the original contract amount is earned, 25% of the amount bid for mobilization will be paid.
- b. When 25% of the original contract amount is earned, 50% of the amount bid for mobilization will be paid.
- c. When 50% of the original contract amount is earned, 75% of the amount bid for mobilization will be paid.
- d. When 75% of the original contract amount is earned, 100% of the amount bid for mobilization will be paid.

**B. EXCAVATION AND REMOVAL OF LINER, SEDIMENT, AND SUB-BASE MATERIAL**

1. **METHOD OF MEASUREMENT** This Bid Item shall be paid for on a unit price basis for the completion of the work.
2. **BASIS OF PAYMENT** Payment shall be made at the contract base bid price. Payment shall be considered complete compensation for all labor, and equipment, to excavate and remove the existing liner, existing concrete structures, and sediment. This also includes over-excavating the sub-basin material and complete removal of all excavated materials from the site.

**C. FURNISH AND INSTALL GEOTEXTILE**

1. **METHOD OF MEASUREMENT** This Bid Item shall be paid for on a unit price basis for the completion of the work.
2. **BASIS OF PAYMENT** Payment shall be made at the contract base bid price. Payment shall be considered complete compensation for all labor, equipment and materials to place the geotextile per the design drawings and manufactures specifications.

**D. FURNISH AND INSTALL WASHED ROCK/STRUCTURAL FILL**

1. **METHOD OF MEASUREMENT** This Bid Item shall be paid for on a unit price basis for the completion of the work.

2. **BASIS OF PAYMENT** Payment shall be made at the contract base bid price. Payment shall be considered complete compensation for all labor, equipment and materials to place the washed rock per the design drawings.

**E. REINFORCED CONCRETE LINER SYSTEM**

1. **METHOD OF MEASUREMENT** This Bid Item shall be paid for on a lump sum for the completion of the work.
2. **BASIS OF PAYMENT** Payment shall be made at the lump sum bid price. Payment shall be considered complete compensation for all labor, equipment and materials to place the reinforced concrete per the design drawings. This includes steel reinforcement, water stop, restoration of surface improvements around the pond, doweling into the existing curb wall and placing and finishing the concrete.

**F. UNDERDRAIN SYSTEM WITH PERFORATED PIPE AND SUMP**

1. **METHOD OF MEASUREMENT** This Bid Item shall be paid for on a lump sum for the completion of the work.
2. **BASIS OF PAYMENT** Payment shall be made at the lump sum bid price. Payment shall be considered complete compensation for all labor, equipment and materials to excavate and place the sump vault, pumping and support equipment, electrical connection to existing power, piping and perforated drain pipe per the design drawings.

**G. MISCELLANEOUS**

1. **METHOD OF MEASUREMENT** This Bid Item shall be paid for on a lump sum for the completion of the work.
2. **BASIS OF PAYMENT** Payment shall be made at the lump sum bid price. Payment shall be considered complete compensation for all labor, equipment and materials to perform any miscellaneous work such as landscaping, project management, traffic control, overhead, and etc.

**H. TOTAL BASE BID**

1. The total base bid should agree with the sum of the total amounts for each item on the bid schedule. Items 2, 4, and 5 on the bid schedule must be provided with a unit cost and a total amount which agrees with the unit cost times the give quantity. Items 1, 3, 6 and 7 need only a total amount given for the work described.

- END OF SECTION -



12217 South Lone Peak Parkway, Suite 100  
Draper, Utah 84020  
Phone 801.545.8500  
Fax 801.545.8600  
www.terracon.com

December 16, 2004

Mr. Delmas W. Johnson  
Nolte Associates, Inc.  
6671 South Redwood Road, Suite 101  
West Jordan, UT 84088

**RE: Geotechnical Engineering Report  
Utah Valley State College Irrigation Ponds Rehabilitation  
Orem, Utah  
Terracon Project No. 61045067**

Gentlemen:

At your request, Terracon has performed a geotechnical exploration for the proposed Utah Valley State College (UVSC) Irrigation Ponds Rehabilitation project located on the UVSC campus in Orem, Utah. This exploration was authorized by you on December 6, 2004 and performed in general conformance with our Proposal for Geotechnical Engineering Services, dated November 15, 2004. The accompanying report describes the exploration and summarizes our findings in regards to depth to groundwater, hydraulic conductivity of the soils underneath the ponds and other soil-related issues.

## **PROJECT UNDERSTANDING**

We understand that the project consists of designing and constructing a new concrete liner system for two existing irrigation ponds to replace the existing geosynthetic liner system. Grading plans and finished elevations of the new concrete liner system were not available at the time this report was prepared. However, we understand that the proposed concrete liners will be constructed within 1 to 3 feet of the existing grades of the pond bottoms.

## SITE EXPLORATION PROCEDURES

### Field Exploration

Our subsurface exploration was conducted on December 2, 2004. The exploration included drilling 4 borings to depths ranging between approximately 5 and 6½ feet below the existing site grade. The approximate locations of the borings in relation to the proposed construction are shown on the Boring Location Plan, included in the attached figures. The borings were located by reference to existing on-site features. The locations are approximate and should be considered accurate only to the degree implied by the means and methods used to determine them.

The borings were drilled using a hand auger. Disturbed soil samples were collected at various depths utilizing the hand auger. Terracon personnel prepared boring logs during drilling. The soil samples were packaged and transported to our Draper laboratory for further observation and testing.

### Laboratory Testing

Samples obtained during the field exploration were visually classified in the laboratory in general accordance with the Unified Soil Classification System (USCS). The USCS is described in the attached figures.

Representative soil samples were selected for testing to determine physical and engineering properties and to aid in classification. Following are the laboratory tests performed and a brief description of each test:

**Atterberg Limits:** Consistency and range of moisture content within which the material is workable.

**Natural Water Content:** The percentage of water by dry weight in the soil at the sample location.

**Minus 200 Sieve Analysis:** Percent of soil particles passing the No. 200 sieve.

Results of the laboratory tests are summarized on the boring logs in the attached figures and in the following sections of this report.

## SITE CONDITIONS

The project site is located at the southwestern end of the Utah Valley State College campus, near the intersection of University Parkway and Interstate I-15 in Orem, Utah. The site is bounded to the south by an asphalt concrete parking lot, to the east by a baseball

diamond and stadium, and to the west and north by campus buildings. At the time of our site visit, the existing irrigation ponds had been drained, though isolated areas of frozen standing water and small, possibly spring-fed streams were observed. Vegetation in the ponds consisted of grass and weeds.

## **SUBSURFACE CONDITIONS**

### **Soil Conditions**

Subsurface conditions encountered at the site are indicated on the boring logs in the attached figures. The stratification lines shown on the logs represent the approximate boundary between the soil types encountered; the actual transition may be gradual.

Soil conditions encountered in the borings consisted of approximately ½ to 1 foot of fine-grained sandy clay, sandy silt and clayey sand sediments that have been deposited in the ponds during past use. Immediately below the sediments, a geosynthetic pond liner was encountered. In Borings B-1 and B-2, clay and sandy clay were encountered below the pond liner to the maximum depth explored of 5 feet. In Boring B-3, silty sand was encountered to the maximum depth explored of 5.5 feet. In Boring B-4, silty sand was encountered to a depth of 2.5 feet overlying sandy clay to the maximum depth explored of 6.5 feet.

Laboratory test results indicate liquid limits and plasticity indexes of about 38 percent and 18 percent in the clay, respectively. The sand has about 39 percent passing the No. 200 Sieve (fines content).

### **Groundwater Conditions**

The borings were monitored during drilling for the presence and level of groundwater. At the time of our field exploration, groundwater was encountered immediately below the geosynthetic pond liner at a depth of approximately 1 foot below existing site grades in Borings B-1 and B-2 and at a depth of approximately 6½ feet below existing site grades in Boring B-4. Groundwater was not encountered within the depths explored of 5½ feet in Boring B-3. It should be recognized that fluctuations of the groundwater table may occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Evaluation of these factors is beyond the scope of this exploration.

## CONCLUSIONS

Open-hole field permeability tests were completed in each of the four borings. The tests were performed by filling the borings with water and monitoring the rate at which the water level decreased over time. The decrease in water depth was converted to an approximate volume in order to estimate hydraulic conductivity for the tested soil layers. The test depths ranged between approximately 2 feet and 6.5 feet. Final estimated hydraulic conductivity values for each test are presented in the following table.

Boring	Water Flow Rate (gal/min)	Test Length (ft)	Hydraulic Conductivity (ft/yr)
1	0.003	2	40
2	0.016	5	150
3	0.024	5.5	40
4	0.011	6.5	15

Generally, the upper 6 to 12 inches of the soil encountered in the borings consisted of sediment that has been deposited in the pond during operation. These sediments contain lenses of sand, silt and clay. These soils were included in the permeability test lengths in each boring. The composite permeability rates presented in the preceding table may be slightly higher than the underlying native soils due to the generally loose and sandy nature of these sediments.

## GENERAL COMMENTS

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

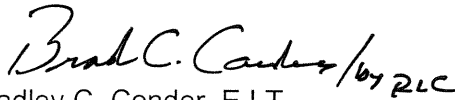
This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

Utah Valley State College Ponds  
Orem, Utah  
Terracon Project No. 61045067  
December 16, 2004

Terracon

We appreciate the opportunity to be of service on this project. If you have questions regarding this report or if we can be of further assistance, please call.

Sincerely,  
**TERRACON**

Handwritten signature of Bradley C. Conder, with a small 'by RL' written at the end.

Bradley C. Conder, E.I.T.  
Geotechnical Staff Engineer

Handwritten signature of Rick L. Chesnut.

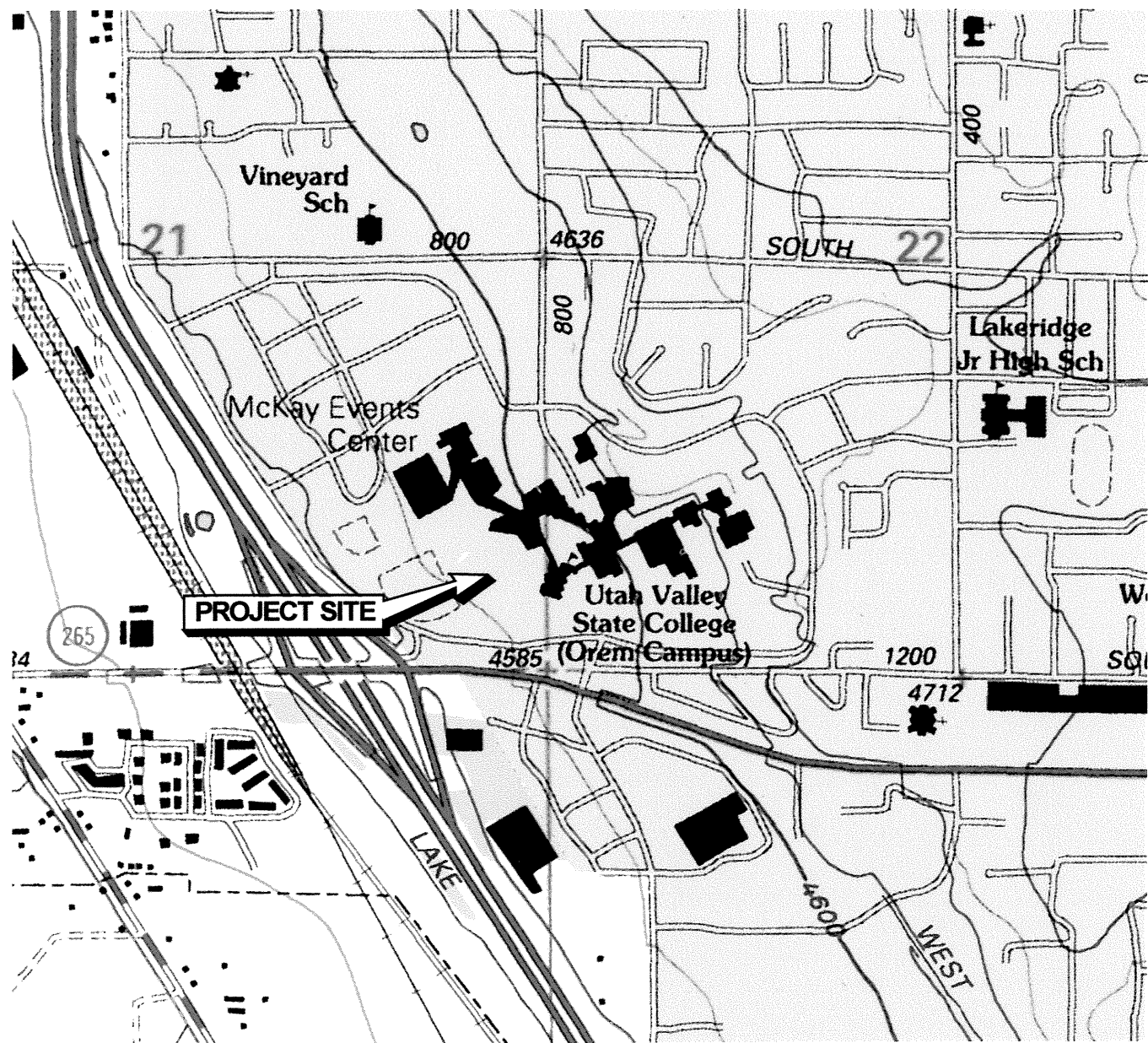
Rick L. Chesnut, P.E.  
Utah Operations Manager

BCC/rlc

Enclosures (6)

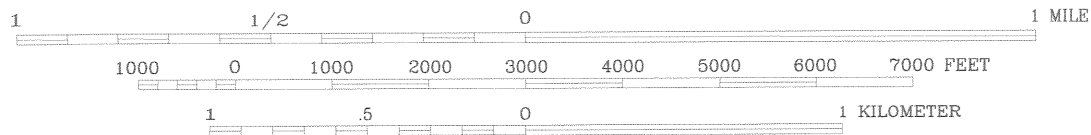
Copies: Addressee (3)

N:\PROJECTFILES2004\61045067\61045067rpt.doc



Reference: USGS 7.5-Minute Quadrangles for Orem, Utah

SCALE 1:24,000



CONTOUR INTERVAL 40 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929



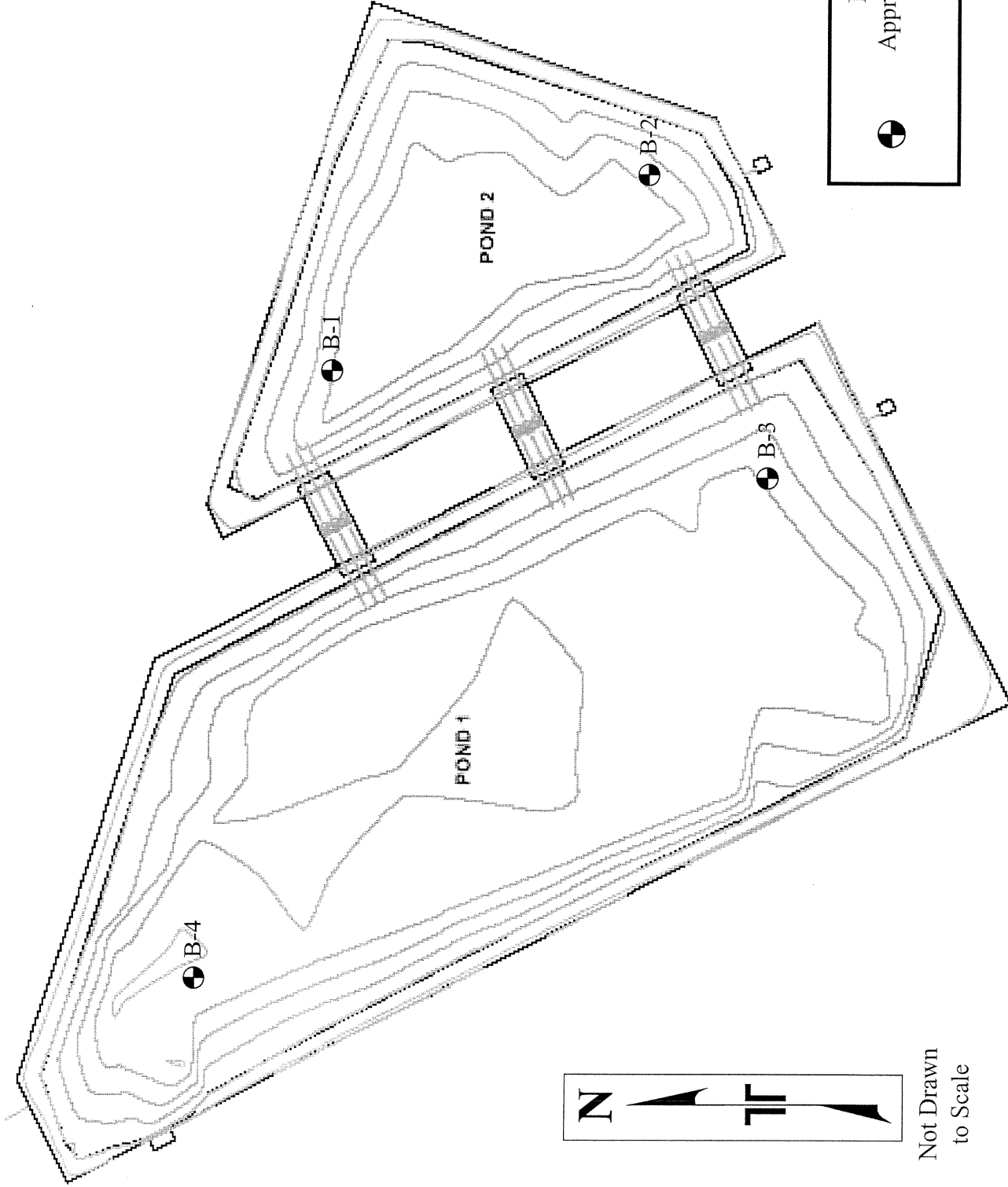
# **PROJECT VICINITY MAP** **UTAH VALLEY STATE COLLEGE PONDS** **OREM, UT**

Job No. 61045067

Date: Dec. 2004

Drawn By: ALC

**Terracon**



Not Drawn  
to Scale

LEGEND  
 Approximate Boring Location

**BORING LOCATION PLAN**  
 UTAH VALLEY STATE COLLEGE PONDS  
 OREM, UTAH

Job No. 61045067


Date: December 2004

Drawn by: BCC

**Terracon**

# LOG OF BORING NO. B-1

Page 1 of 1

CLIENT Nolte Associates		PROJECT Utah Valley State College Ponds											
SITE Orem, Utah		Utah Valley State College Ponds											
GRAPHIC LOG		DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS					
				NUMBER	TYPE	RECOVERY, in.	PENETRATION RESISTANCE BLOWS / ft.	WATER CONTENT, %	DRY UNIT WEIGHT, PCF	LIQUID LIMIT	PLASTICITY INDEX	% PASSING NO. 200 SIEVE	OTHER
	1	1											
		2	CL	1	BS					38	18		
		3		2	BS								
		4											
	5	5	CL	3	BS					38	18		
BOTTOM OF BORING AT APPROXIMATELY 5 FEET													

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

## WATER LEVEL OBSERVATIONS, ft



WL	▽ 1	WD	▽
WL	▽		▽
WL			

# Terracon

BORING STARTED	12-2-04
BORING COMPLETED	12-2-04
RIG	FOREMAN BCC
LOGGED BCC	JOB # 61045067





# LOG OF BORING NO. B-2

Page 1 of 1

CLIENT <b>Nolte Associates</b>													
SITE <b>Orem, Utah</b>		PROJECT <b>Utah Valley State College Ponds</b>											
GRAPHIC LOG		DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS					OTHER
				NUMBER	TYPE	RECOVERY, in.	PENETRATION RESISTANCE BLOWS / ft.	WATER CONTENT, %	DRY UNIT WEIGHT, PCF	LIQUID LIMIT	PLASTICITY INDEX	% PASSING NO. 200 SIEVE	
	1	1	1	BS									
		1	2	BS									
		2											
		3	3	BS									
		4											
	5	5	4	BS									
<b>CLAYEY SAND:</b> dark brown to black, pond sediment - geosynthetic pond liner at 1 foot  <b>CLAY:</b> brown with orange mottling  - orange and black mottling													
BOTTOM OF BORING AT APPROXIMATEY 5 FEET													

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

## WATER LEVEL OBSERVATIONS, ft

WL	 1	WD	
WL			
WL			

# Terracon

BORING STARTED	12-2-04
BORING COMPLETED	12-2-04
RIG	FOREMAN BCC
LOGGED BCC	JOB # 61045067

# LOG OF BORING NO. B-3

Page 1 of 1

CLIENT <b>Nolte Associates</b>														
SITE <b>Orem, Utah</b>		PROJECT <b>Utah Valley State College Ponds</b>												
GRAPHIC LOG			DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS					OTHER
					NUMBER	TYPE	RECOVERY, in.	PENETRATION RESISTANCE BLOWS / ft.	WATER CONTENT, %	DRY UNIT WEIGHT, PCF	LIQUID LIMIT	PLASTICITY INDEX	% PASSING NO. 200 SIEVE	
	0.5	<b>CLAYEY SAND:</b> black, pond sediment - geosynthetic pond liner at 0.5 feet <b>SILTY SAND:</b> brown with orange mottling	1											
			2											
			3	SM	2	BS			25				39	
			4											
			5											
	5.5													
		BOTTOM OF BORING AT APPROXIMATELY 5.5 FEET												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

## WATER LEVEL OBSERVATIONS, ft

WL	▽ N/E	WD	▽
WL	▽		▽
WL			

# Terracon

BORING STARTED	12-2-04
BORING COMPLETED	12-2-04
RIG	FOREMAN BCC
LOGGED BCC	JOB # 61045067

# LOG OF BORING NO. B-4

Page 1 of 1

CLIENT		Nolte Associates											
SITE		PROJECT											
Orem, Utah		Utah Valley State College Ponds											
GRAPHIC LOG		DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS					OTHER
				NUMBER	TYPE	RECOVERY, in.	PENETRATION RESISTANCE BLOWS / ft.	WATER CONTENT, %	DRY UNIT WEIGHT, PCF	LIQUID LIMIT	PLASTICITY INDEX	% PASSING NO. 200 SIEVE	
	1												
		1		1	BS								
	2.5	2											
		3		2	BS								
		4											
		5		3	BS								
		6		4	BS								
	6.5												
	BOTTOM OF BORING AT APPROXIMATELY 6.5 FEET												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

## WATER LEVEL OBSERVATIONS, ft

WL	▽ 6.5	WD	▽
WL	▽		▽
WL			

# Terracon

BORING STARTED	12-2-04
BORING COMPLETED	12-2-04
RIG	FOREMAN BCC
LOGGED BCC	JOB # 61045067

## GENERAL NOTES

### DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1-3/8" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 3" O.D., unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 3" O.D. ring samplers (RS) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per foot," and is not considered equivalent to the "Standard Penetration" or "N-value".

### WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

**DESCRIPTIVE SOIL CLASSIFICATION:** Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

#### CONSISTENCY OF FINE-GRAINED SOILS

<u>Unconfined Compressive Strength, Qu, psf</u>	<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Consistency</u>
< 500	<2	Very Soft
500 – 1,000	2-3	Soft
1,001 – 2,000	4-6	Medium Stiff
2,001 – 4,000	7-12	Stiff
4,001 – 8,000	13-26	Very Stiff
8,000+	26+	Hard

#### RELATIVE DENSITY OF COARSE-GRAINED SOILS

<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Ring Sampler (RS) Blows/Ft.</u>	<u>Relative Density</u>
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 49	59-98	Dense
50+	99+	Very Dense

#### RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 – 29
Modifier	> 30

#### GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

#### RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 – 12
Modifiers	> 12

#### PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1-10
Medium	11-30
High	30+

# Terracon

# UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests<sup>A</sup>

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests <sup>A</sup>				Soil Classification	
				Group Symbol	Group Name <sup>B</sup>
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines <sup>C</sup>	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well-graded gravel <sup>F</sup>
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel <sup>F</sup>
		Gravels with Fines More than 12% fines <sup>C</sup>	Fines classify as ML or MH	GM	Silty gravel <sup>F,G,H</sup>
			Fines classify as CL or CH	GC	Clayey gravel <sup>F,G,H</sup>
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines <sup>D</sup>	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW	Well-graded sand <sup>I</sup>
			$Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly graded sand <sup>I</sup>
		Sands with Fines More than 12% fines <sup>D</sup>	Fines classify as ML or MH	SM	Silty sand <sup>G,H,I</sup>
			Fines Classify as CL or CH	SC	Clayey sand <sup>G,H,I</sup>
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	$PI > 7$ and plots on or above "A" line <sup>J</sup>	CL	Lean clay <sup>K,L,M</sup>
			$PI < 4$ or plots below "A" line <sup>J</sup>	ML	Silt <sup>K,L,M</sup>
		organic	Liquid limit - oven dried < 0.75	OL	Organic clay <sup>K,L,M,N</sup>
			Liquid limit - not dried		Organic silt <sup>K,L,M,O</sup>
	Silts and Clays Liquid limit 50 or more	inorganic	$PI$ plots on or above "A" line	CH	Fat clay <sup>K,L,M</sup>
			$PI$ lots below "A" line	MH	Elastic Silt <sup>K,L,M</sup>
		organic	Liquid limit - oven dried < 0.75	OH	Organic clay <sup>K,L,M,P</sup>
			Liquid limit - not dried		Organic silt <sup>K,L,M,Q</sup>
Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

<sup>A</sup> Based on the material passing the 3-in. (75-mm) sieve

<sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

<sup>C</sup> Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

<sup>D</sup> Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

<sup>F</sup> If soil contains  $\geq 15\%$  sand, add "with sand" to group name.

<sup>G</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

<sup>H</sup> If fines are organic, add "with organic fines" to group name.

<sup>I</sup> If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.

<sup>J</sup> If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

<sup>K</sup> If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

<sup>L</sup> If soil contains  $\geq 30\%$  plus No. 200 predominantly sand, add "sandy" to group name.

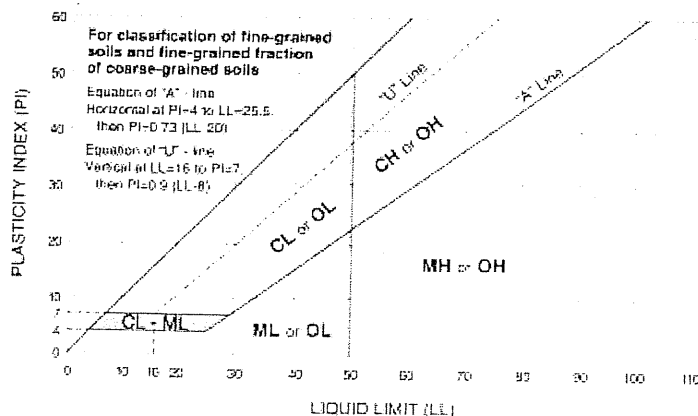
<sup>M</sup> If soil contains  $\geq 30\%$  plus No. 200, predominantly gravel, add "gravelly" to group name.

<sup>N</sup>  $PI \geq 4$  and plots on or above "A" line.

<sup>O</sup>  $PI < 4$  or plots below "A" line.

<sup>P</sup>  $PI$  plots on or above "A" line.

<sup>Q</sup>  $PI$  plots below "A" line.



**Terracon**